

Oral Expositions

4 - Intracranial Aneurysms

0007

Sufocate PRO: Study for Cerebral Aneurysms Treated with Prolonged Balloon Occlusion Times

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Purpose: Temporary balloon occlusion (TBO) during balloon-assisted coiling (BAC) is usually restricted to three minutes. In our experience, TBO may be at least doubled without increasing symptomatic ischemic complications, regardless of aneurysm location.

Methods: Unruptured aneurysms treated with at least one TBO ≥ 7 consecutive minutes were identified from our prospective registry. Anti-aggregation, full heparinization and mean arterial pressure ≥ 90 mmHg were maintained during the entire procedure. MR diffusion-weighted imaging (DWI) was systematically obtained within 24-48h and ischemic events further dichotomized into silent versus symptomatic. We used Student t-test and Chi-Square test (or Fisher's exact test) for continuous and qualitative variables, respectively. Statistical significance level was set at 0.05.

Results: 112 unruptured cerebral aneurysms in 103 patients were treated with prolonged TBO between July and December 2012. Mean single TBO was 11 minutes. Silent and symptomatic TBO-related DWI lesions occurred in 46.4% (52/112) and 2.7%, respectively, with a rate of transient and permanent minor deficits in 0.9% (1/112) and 1.8% (2/112), respectively. There were no deaths or major neurological deficits. TBO duration was not significantly associated with DWI hits. Multiple inflations showed a trend towards increased DWI lesions ($p=0.08$). Stenting was a significant predictor of DWI lesions ($p=0.042$).

Conclusion: TBO may be prolonged beyond 10 consecutive minutes during BAC, provided optimal blood pressure, anti-aggregation, and heparinization are maintained throughout the procedure.

0012

Stretch Resistant Coils for Intracranial Aneurysms: One Step Forward or Two Steps Back?

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Background and Purpose: Most coil systems contain an inner wire for stretch resistance during coil withdrawal. There is clinical and experimental evidence that this SR wire negatively affects physical and handling properties of the coil and thus safety and obtained packing densities. To test this hypothesis, we compared packing densities between SR coils and standard coils.

Materials and Methods: packing densities were calculated of 74 volume matched aneurysm pairs treated with newly introduced SR Galaxy coils or standard Tru-Fill/Orbit coils, the SR wire being the only difference between the 2 types of coils. Also additional clinical and aneurysm characteristics were compared.

Results: Volume matching was near-perfect: Mean volume of 74 aneurysms treated with Galaxy coils was 110 mm³ and for 74 aneurysms treated with TruFill/Orbit coil this was 111 mm³ ($p=0.96$). There were no significant differences in procedural morbidity, gender, aneurysm location, rupture status and additional treatments at follow-up. Mean packing of aneurysms treated with TruFill/Orbit was 29.3% and of aneurysms treated with Galaxy coils this was 25.7%. This difference was statistically significant ($p=0.0021$).

Conclusion: the SR wire inside the primary winding of the new Galaxy coils negatively influences handling which is reflected in lower obtained packing densities compared to standard TruFill/Orbit coils without SR. The advantage of SR may be outweighed by the impaired handling. Both SR and standard coil lines should remain available on the market.

0024

Orbit Galaxy G2 Coils: Preliminary Single Center Experience with New Thermo-Mechanical Ultrafast Detachment System

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Purpose: Orbit Galaxy G2 coils have already shown to be very effective both in ruptured and unruptured aneurysms. Increase packing density with use of softer 3D coils (Xtrasoft) and complex shape random loop design have been indicated in reducing aneurysm recurrence. Plus the new Enpower thermo-mechanical detachment system with unic distal flexible double rings junction ensures immediate and safe coils placement.

Materials and Methods: From november 2012 to april 2013 we treated 12 patients/12 aneurysms (9F/3M, age 19-82 yo) using Orbit Galaxy G2 coils. 10/12 ruptured and 2/12 unruptured aneurysms, sized 3 to 13 mm. All coiled aneurysms were located in anterior circulation (5 anterior cerebral artery, 3 posterior cerebral artery, 3 middle cerebral artery, 1 pericallosal artery).

Results: The occlusion rate of 90% or more was achieved in 90% of cases. The only complication was an intraoperative aneurysm rupture not related to the detachment system. Discharged modified Rankin score of 0 or 1 was achieved in 100% of elective cases and 80% of ruptured ones.

Conclusion: The complex shape random loop design and high coils conformability helps in achieving very high primary aneurysms' occlusion rate. Plus the new technology of the Enpower thermo mechanical detachment system makes Orbit Galaxy G2 coiling rapid, atraumatic and safe: the ultra-fast and secure coils detachment helps in terms of time saving and in minimizing the operatory depending manouvers.

0032

Mechanical Thrombectomy and Coiling Ruptured Aneurysms.

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Purpose: Share our experience coiling a recently ruptured aneurysm, and the occlusion of a major brain artery.

Materials and Methods: This is an observational, retrospective study. We received two patients with recently ruptured anterior communicating aneurysms. During conventional angiography, the left middle cerebral arteries were suddenly occluded in both cases. Neither of the patients had an atheromatosis diseases in cervical carotid arteries. Solitaire FR stents were used to open the arteries. In one case, the clot was completely retrieved. In the other, the thrombus suffered fragmentation and travelled distally to M3 territory. We injected locally and systemically fibrinolytics. This patient had a protein C deficit.

Results: Complete occlusion of the ruptured aneurysms were achieved. In one case, total flow restoration was obtained. No post operative deficit. In the other case, the clot was fragmented. Fibrinolytics were injected locally and systemically. Her neurological status remained unchanged after procedure.

Conclusions: Even though it is not a common complication, thromboembolic events could happen during angiography or embolizations procedures. Consider antiplatelet therapy before procedure whenever is possible.

0034

Low-Profile Visible Intraluminal Support Device (LVIS) Jr: Initial Multicenter Experience

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Introduction: Wide-neck aneurysms incorporating a portion of the parent artery can be challenging to treat and may require combined balloon-remodeling and stent-assisted techniques. LVIS Jr can be delivered through a remodeling balloon and is a new hybrid stent design that incorporates a lower porosity. It is more navigable than current generation stents and also possesses some flow diversion characteristics. This study reports the initial multicentre experience using the LVIS Jr stent.

Methods: We have reviewed cases in which LVIS Jr was used in conjunction with coil embolization. Aneurysm characteristics, technical details, and peri-procedural events were recorded. All patients were pre-medicated and maintained on dual-antiplatelet therapy.

Results: We had 7 patients with 7 aneurysms (4 ACoMA, 2 MCA bifurcations and 1 BA termination) treated using 8 LVIS Jr devices. All stents have been successfully deployed. The "balloon-then-stent" method was used in 3 cases and the stent was placed before aneurysm coiling in 4 cases. A "Y" stent construction was planned in 3 cases however, was only required in one case as a single stent resulted in satisfactory coverage of the neck in 2 cases. Six aneurysms were completely occluded initially and remained so at follow-up, one patient progressed to complete occlusion at follow-up. There were no procedural complications.

Conclusion: The LVIS Jr stent is a promising device for stent assisted coiling. It has high navigability, can be delivered through a remodeling balloon and has flow-diversion characteristics which potentially expand the options currently available for management of wide-neck aneurysms.

0041

Contra-Lateral Approach for VA-PICA Broad Neck Aneurysm

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Introduction: Balloon or stent assisted coiling can be considered for selective occlusion of such broad neck PICA aneurysm. In some PICA aneurysms, navigation of the stent through the ipsilateral vertebral artery may be difficult or impossible due to the unfavorable geometry of the aneurysm and/or parent vessel. We present two cases of a patient with broad neck VA-PICA aneurysms, which were treated by the retrograde stenting through the contralateral vertebral artery and vertebro-basilar junction with ante-grade coil embolization.

Case 1: A 77-year-old woman presented with unruptured right VA-PICA aneurysm, which was recognized on MRA. We perform coil embolization for right VA-PICA aneurysm using balloon neck remodeling technique. However during coil embolization, the flow of PICA could not be kept due to narrowing caliber of PICA and thrombus on coil. We inserted intracranial stent via left vertebral artery to right PICA. Final angi-

ogram showed preservation of PICA and no neurological deterioration was recognized.

Case 2: A 56-year-old woman presented with a ruptured left VA-PICA aneurysm. Aneurysm was successfully stented from contralateral VA into the PICA. We perform coil embolization using jail technique. Final angiogram showed complete obliteration of aneurysm and preservation of PICA and VA flow.

Discussion: Contralateral approach could be suitable for the limited cases of VA-PICA aneurysm with broad neck, which is depending on anatomical projection of the origin of PICA with acute angle.

Conclusion: we reported two cases of VA-PICA aneurysm with broad neck using contralateral approach.

0046

Follow Up Results of Endovascular Treatment of Intradural Aneurysms of the Anterior Part of the Circle of Willis.

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Purpose: Evaluation of results of endovascular treatment of intradural aneurysms of the anterior part of the circle of Willis.

Material and Methods: Retrospective analysis of 305 patients with 317 intradural aneurysms of the anterior part of the circle of Willis treated at our institution in the period from 2000 to 2011. Age range from 12 to 79 years old; 17.3% patients had multiple aneurysms. Endovascular procedures included coiling alone and balloon and stent assisted coiling.

Results and Discussion: The following clinical outcomes have been observed: absence of neurological deficits in 282 (92.5%) cases, permanent neurological deficits in 15 (4.9%) patients; intraoperative ruptures in 14 patients, thromboembolism in 17 patients. Complete occlusion was achieved in 220 cases. During the last few years, the number of complications was decreased as a result of improved technique, mandatory use of general anesthesia, as well as aggressive prophylaxis and treatment of thromboembolic complications. Follow up **Results:** were studied in 179 patients (1 to 11 years). Full occlusion was maintained in 89% of patients with previous full occlusion; in 13 patients with remnant neck repeated procedure was done and full occlusion was achieved. Only one patient 5 years after procedure developed intracranial bleed through fully occluded aneurysm and was successfully treated with clipping. 2 deaths were observed from unrelated pathology.

Conclusion: Endovascular treatment of intradural aneurysms of the anterior circle of Willis by can be advised for this group of patients. It is also important to recognize possibility of serious complications and make full disclosure of those to the patient.

0049

Coincidental Cerebral Venous Thrombosis and Subarachnoid Hemorrhage Related to Ruptured Anterior Communicating Artery Aneurysm

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Purpose: Both cerebral venous thrombosis (CVT) and aneurysmal SAH are rare entities. We present a case of acute coincidental presentation of both entities, CVT likely following aneurysmal rupture, and discuss the possible relation in etiology.

Case Report: A 63-year-old woman presented with disorientation and aphasia following 3 weeks of headache. CT and MR/MRV disclosed superior sagittal/right lateral sinus thrombosis and left frontal and parietal infarcts. Left subarachnoid hemosiderosis without fresh blood was also seen. In addition, high-grade left MCA M1 and bilateral A2 stenoses were seen on MRA. An aneurysm of AcomA was not clearly depicted on MRA due to motion artefacts, but was suspected on contrast-enhanced T1w images. At this stage, hemosiderosis with consecutive vasospasms and likely venous infarcts were interpreted as being secondary to CVT only. The patient received oral anticoagulation and went to rehabilitation, but presented back with acute SAH 5 weeks later. CTA disclosed AcomA aneurysm and MCA/ACA vasospasm. Uncomplicated coil embolization and intraarterial vasospasm therapy were performed.

Discussion and Conclusion: Coincidental or even related aneurysmal SAH and CVT have to our knowledge not been reported previously. In this case, hemosiderosis and proximal vasospasms were presumably related to subacute SAH from initially undisclosed aneurysm rupture. Although aneurysmal SAH is known risk factor for peripheral venous thromboembolism, CVT has not been reported hitherto. Less extensive SAH may solely be caused by CVT. However, vasospasm and hemosiderosis close to AcomA region at initial presentation may favor SAH from aneurysm rupture as likely cause of CVT.

0059

Aneurysmal Wall Enhancement and Perianeurysmal Edema after Endovascular Treatment of Unruptured Cerebral Aneurysms

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Background: Perianeurysmal edema is a previously described phenomenon after coil embolization attributed to inflammatory reaction. We aimed to demonstrate the prevalence and natural course of these phenomena in endovascularly treated unruptured aneurysms, and to identify factors that contributed to their development.

Materials and Methods: We performed a retrospective analysis of consecutive endovascularly treated unruptured aneurysms between January 2000 and December 2011. The presence and evolution of wall enhancement and perianeurysmal edema on MRI after treatment were analyzed. Variable aneurysm related factors were compared among aneurysms with and without edema.

Results: 132 unruptured aneurysms in 124 patients underwent endovascular treatment. 85 (64.4%) aneurysms had wall enhancement and 9 (6.8%) aneurysms had perianeurysmal brain edema. Wall enhancement tends to persist for years with 2 patterns identified. Larger aneurysms and brain embedded aneurysms are significantly associated with wall enhancement. In all edema cases the aneurysms were embedded within the brain and had wall enhancement. Progressive thickening of wall enhancement was significantly associated with edema. Edema can be symptomatic when in eloquent brain and stabilizes or resolves over years.

Conclusions: Aneurysmal wall enhancement is a common phenomenon following endovascular treatment of unruptured aneurysms and in most cases remains unchanged over years. Perianeurysmal edema is rare and can cause neurological symptoms when located in eloquent regions. Edema develops in aneurysms with wall enhancement and that are embedded in brain parenchyma.

0069

A Novel Surgical Support Device in Neuroendovascular Therapy: the Y-Connector Holder Board

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Purpose: We attempted to use a board that enables the operator to manipulate the microcatheter and coil-delivery wires synchronously with two hands. The device we used is an acrylic board with a holder for the Y-connector attached to the microcatheter. While the left hand manipulates the microcatheter, the right hand can advance and retract the coil-delivery wires because of the Y-connector fixed by the acrylic board with the Y-connector holder, which is pressed on the table by the bottom of palm of the right hand.

Materials and Methods: We used Y-connector holder board (YCHB) in ten cases of aneurysm coil embolization.

Results: YCHB was helpful for the following: advancing the microcatheter tip at an acute angle into the anterior cerebral artery at its origin from the internal carotid artery, placing the microcatheter tip into cerebral aneurysm, controlling the microcatheter tip during coil placement in cerebral aneurysm involving the bleb portion, and in case of kick back phenomenon.

Conclusion: YCHB may make coil embolization procedures safer, easier and more precise. In addition, it is simple, easy to use, and cheap.

0071

Neuropsychologic Deficits and Structural Brain Damage after Aneurysm Treatment in Patients with Good Clinical Outcome

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Purpose: Despite good outcome after treatment of aneurysms many patients are complaining about mood disorders and chronic headaches. We aimed to investigate whether the history of SAH or treatment modality are crucial for neuropsychologic deficits and if any specific brain changes are associated with these disorders.

Methods: Patients with or without previous SAH treated by surgical clipping or endovascular coiling were assessed by a test battery including Hospital Anxiety and Depression Scale (HADS), Beck depression inventory (BDI) and Headache Impact Test (HIT-6). Additionally, brain MRI including 3D T1, H1-MRS and DTI are performed.

Results: No differences were found between patients with and without previous SAH in respect of depression, anxiety and headaches. Depression occurred significantly more often after surgery than compared with coiling with an HADS of 13.9 vs. 9.7. All surgically treated patients showed lower mean concentrations of hippocampal NAA (0.00479 versus 0.00946) and Glx (0.011 versus 0.013) compared to those treated by coiling. Additionally surgical treatment resulted in a significantly hippocampal atrophy. In the DTI measurement the FA values in the hippocampus were significantly increased in patients treated by surgical approach compared to coiling as well as a significant decrease in ADC could be detected after surgical clipping.

Conclusion: Aneurysm surgery seems to be associated with higher incidence of mood disorders compared to endovascular treatment independently of preceding SAH. Additionally surgical aneurysm clipping seems to induce a much severe structural damage to the depression-associated hippocampal area than endovascular coiling.

0078

Mirror Dissecting Aneurysms of distal PICAs: Report of 1 Case

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Purpose: Here we report a singular case of mirror dissecting aneurysms of both distal PICAs (Posterior Inferior Cerebellar Arteries) in one patient, managed by endovascular Neuroradiology.

Methods: 3 weeks after SAH (Sub-Arachnoid Haemorrhage) and already showing cerebral damaged areas, a 51 years old female patient was transferred to the intensive care of our hospital for the neuroendovascular evaluation of one single PICA aneurysm detected at MRI. However, at the CTAngio and DSA we found mirror dissecting aneurysms of the distal portion of both PICAs. We treated them with multistep occlusion of both PICAs at the level of dissection, in delayed endovascular procedures.

Results: Good exclusion of both aneurysms and stable supply flow.

Good clinical outcome, despite the tolerable lower limb ataxia.

Conclusions: PICA aneurysms are rare (0.5-3 % of intracranial aneurysms); even rarer are the dissecting aneurysms of the PICA, and almost always they are presenting with SAH; only a few cases of mirror aneurysms of the PICA are described in the literature, but all at the proximal portion of the artery. The treatment of distal dissecting aneurysms of PICA is very difficult for neurosurgeons and neuroradiologists too, and sometimes it requires the occlusion of the vessel. Treatment becomes more risky in the case of mirror aneurysms but it is possible using delayed endovascular sessions to support the enhancing of collateral circulation, as in our experience. This is the first described report not only of the detection but also of the endovascular treatment of mirror dissecting aneurysms of both PICAs.

0082

Can Over-size Coiling decrease Recanalization rate after Coiling of Intracranial Aneurysm?

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Purpose: Recanalization is still a major concern in the coiling of intracranial aneurysms. We evaluated whether over-size coiling can decrease the recanalization rate in the coiling of intracranial aneurysm.

Materials and Methods: Consecutive 65 aneurysms of 63 patients more than 5mm size which were coiled between 2008 and 2010 and had at least 6 months follow up MRA or conventional angiogram were enrolled in this study. Among the 65 aneurysms, 17 aneurysms were treated with over-size coiling. We defined over-size coiling as using at least a 15% larger frame coil than long diameter of aneurysm. We analyzed aneurysm rupture and thrombo-embolic events during the procedure and the recanalization rate during the follow up period in the over-size coiling group.

Results: Follow up periods were from 6 months to 48 months. Long diameters of over-size coiled aneurysm were from 6.8 to 16mm (median 9mm). Among the 17 over-size coiling group (15 unruptured and 2 ruptured aneurysms), only one aneurysm revealed recanalization (5.9%). In the non over-size coiling group, 8 aneurysms were recanalized (16.7%). There was no aneurysm rupture during coiling in the over-size group. Thrombo-embolic event occurred in one patient of the over-size group and 4 patients of the non over-size group.

Conclusion: Over-size coiling seems to be another promising **Method:** to decrease recanalization in selected aneurysms. Its efficacy and safety need to be evaluated in larger controlled studies.

0084

Flow-Diverters (Silk and Pipeline) for Neurovascular Reconstruction: Initial Experience in the Treatment of 87 Intracranial Aneurysms, Pseudoaneurysms and Dissections

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Introduction: The purpose of this study was to evaluate the safety and efficacy of the recently available flow diverters (Silk and Pipeline) for the treatment of intracranial aneurysms and dissections.

Methods: Seventy-eight consecutive patients underwent an endovascular treatment of 87 intracranial aneurysms, pseudo-aneurysms or dissections using flow diverters between 2009 and 2013. The targeted vessels include 76 (87 %) in the anterior circulation and 11 (13%) in the posterior circulation. We treated 76 saccular aneurysms, 8 fusiform aneurysms, 2 vessel dissections, 2 pseudo-aneurysms and 1 displastic vessel. Twenty-nine aneurysms were small, 40 were large and 18 were giant. Multiple devices were implanted in 8 lesions (9,2%). Adjuvant coils were implanted in 16 aneurysms (18%).

Results: Three technical failures of the procedure were encountered. Angiographic follow up examinations were carried out in 41 patients (52 %) and revealed complete occlusion of the target lesion(s) in 25 (63%) of the cases. Late (12 month) angiographic complete occlusion was achieved in 85% of lesions with follow-up. The morbidity was 6.4% (5 patients) and mortality 7.7% (6 patients).

Conclusion: Our experience reveals that the PED procedure is technically straightforward for the treatment of selected wide-necked saccular aneurysms, fusiform aneurysms, remnants of aneurysms, aneurysms with a high likelihood of failure with conventional endovascular techniques, and dissected vessels.

0095

Reconstructive Treatment of Ruptured Blood Blister-like Aneurysms using Stent and Coil

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Purpose: How to treat blood blister-like aneurysms (BBA) is still controversial. To evaluate clinical and angiographic outcomes after reconstructive treatment for BBA using stent and coil.

Materials and Methods: Thirty-four patients (M : F = 6 : 28; mean age, 47.3 years) with ruptured BBAs underwent reconstructive treatment using stent and coil. Post-treatment courses and outcomes were retrospectively evaluated.

Results: Initial treatments were 2 or more overlapping stents with or without coiling (n=28) and single stent with coiling (n=6). Three BBAs re-bled on days 9, 11, and 15 post-treatment, resulting in 1 death. Except for 3 patients who died early, 31 patients were followed-up for 7 – 80 months (median, 32 months). One patient recovered completely but died from complications of

systemic lupus erythematosus at 25 months. Of the remaining 30 patients, 25 were favorable (modified Rankin scale, 0–2) and 5 had unfavorable outcomes. Angiographic follow-up was available in the 32 BBAs. Eight (25.0%) recurred, all within 5 weeks. In multiple stents group (n=26), 22 BBAs showed improvement or complete healing but 4 (15.4%, 2 rebleedings) had recurrence. In single stent with coiling group (n=6), 2 BBAs were stable but 4 (66.7%, 1 rebleeding) had recurrence. Single stent with coiling and Hunt & Hess grade ≥ 4 were two independent risk factors for recurrence ($p < 0.05$).

Conclusions: Reconstructive treatment using stent and coil appears a viable option for BBA. Single stent with coiling and Hunt & Hess grade ≥ 4 were 2 independent risk factors for recurrence. Follow-up angiography should be considered mandatory soon after treatment.

0096

The Correlation Between Hemorrhagic Complication and Platelet Aggregation Test for the Patients with Antiplatelet Treatment

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Purpose: Anti-platelets was used to prevent ischemic complication during perioperative period. We assessed the correlation between hemorrhagic complication and platelet aggregation test for the patients with antiplatelet treatment.

Method: We compared the platelet reactivity between 21 patients with hemorrhagic complication and 258 patients without it. Platelet reactivity was measured with PRU for clopidogrel and ARU for aspirin on VerifyNow.

Result: Hemorrhagic complication rate was 7.1% in the patients with single antiplatelet, 7.5% with dual antiplatelet, 9.1% with triple antiplatelet. The median value of PRU in the patients with hemorrhagic complication was lower than the patients without it (149 vs 189, $p < 0.05$). The median value of ARU was similar between 2 groups (388 vs 392).

Conclusion: PRU on VerifyNow may be the predicting factor of hemorrhagic complication for the patients with clopidogrel.

0098

Single Coil Occlusion as the Safest Strategy for Small Intracranial Aneurysms – A Single Center Experience

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Twenty patients with twenty two small arterial aneurysms were treated with coils at Burnazian FMBC hospital (Moscow, Russia) during the previous fifteen

months (Feb. 2012-May 2013). When necessary, coiling was accompanied with balloon or stent assistance. Of those twenty two aneurysms ten were occluded with single coil. The size of the aneurysms, treated with single coil, mainly ranged from 2 to 4mm, and in one case we achieved occlusion with single coil of 6mm aneurysm, where we've taken an oversized 7x30 coil. The site of the single coil occluded aneurysms located at internal carotid artery in four cases, anterior communicating artery in two cases, anterior cerebral artery in one case, angle between posterior cerebral and superior cerebellar artery in one case, posterior cerebral artery in one case, posterior inferior cerebellar ostium in one case. Occlusion of the aneurysm with a single coil could be achieved if loops covered the neck of the aneurysm, and often it could happen only with 2-dimensional coils, which we had used in five cases of ten. Usually it takes several times of loops repositions to get successful result.

Nevertheless we didn't experience severe procedural complications in both groups of aneurysms, in single coil cases we experienced different level of safety with shorter timing and greater overall control of procedure. We'd chosen single coil occlusion as a first line strategy in small aneurysms, which of cause can always be expanded if necessary.

0104

Endovascular Treatment of Tiny Intracranial Aneurysms

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Purpose: Tiny aneurysms was defined as 3mm or less in maximum diameter. Endovascular treatment of tiny intracranial aneurysms can be challenging. Retrospectively analyze endovascular treatments of 62 tiny intracranial aneurysms to evaluate safety and efficacy.

Materials and Methods: 62 tiny aneurysms, 48 (77.4%) were ruptured aneurysms and 14 (22.6%) were unruptured. Aneurysms were located as follows: internal carotid artery 20, anterior communicating artery 22, anterior cerebral artery 5, middle cerebral artery 9, supra-cerebellar artery 2, distal posterior inferior cerebellar artery 4. Endovascular techniques include coiling by alone, balloon-assisted coiling, stent-assisted coiling, stenting, double microcatheter technique.

Results: 50 aneurysms showed complete occlusion. 10 aneurysms were subtotal occlusion, 2 aneurysm were treated with double stent. During embolization, 2 aneurysms ruptured and were total occluded without neurological dysfunction. 1 middle cerebral artery aneurysm had slight motor aphasia and recovered in 3 days, one case of anterior communicating artery aneurysm had slight contralateral limb paresis after embolization. All cases did not have rebleeding in 6 to 55 months' follow up.

Conclusion: Endovascular treatment of tiny intracranial aneurysm is safe and reliable, with high rate of complete occlusion. The intra-procedural rupture rates were similar compared with embolization of larger aneurysms.

0108

Posterior Communicating Artery Compromise in Coil Embolization of Posterior Communicating Artery Aneurysms

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Purpose: Whether or not the PcomA can be safely compromised during endovascular treatment of a PcomA aneurysm is a matter of debate. Here we present clinical and radiologic outcomes, given this scenario.

Materials and Methods: From data prospectively accrued between January, 2004 and December, 2012, records of 44 patients harboring 46 PcomA aneurysms were retrieved. All had suffered PcomA compromise in the course of endovascular coil embolization. Patients/aneurysms were stratified into those with complete (Group A) and incomplete (Group B) compromise, depending on degree of PcomA flow limitation documented by post-embolization ipsilateral ICA angiography. Clinical and radiologic outcomes were accordingly assessed.

Results: All affected vessels were hypoplastic PcomA variants (PcomA/P1 ratio ≤ 1.0), with exception of a single dominant PcomA (PcomA/P1 ratio, 1.1). In Group A (23 patients, 23 aneurysms), no PcomA compromise-related infarction was evident, whereas in Group B (21 patients, 23 aneurysms), two ischemic events occurred. One patient suffered thalamic infarction, although patency of PcomA was adequate in a follow-up angiogram, and another experienced a transient ischemic attack.

Conclusion: Our findings suggest that obstructed flow in hypoplastic PcomA variants during coil embolization of PcomA aneurysms carries no major consequence. However, incomplete compromise of PcomA may be a source of delayed thromboembolic infarction.

0124

Initial Experience with the New Double-lumen Scepter Balloon Catheter for Treatment of Wide-necked Aneurysms

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Purpose: A new double-lumen balloon catheter was developed for the treatment of cerebral aneurysms. The purpose of this study was to report our initial experience on the use of a double-lumen balloon catheter for treatment of wide-necked aneurysms.

Materials and Methods: Seventeen patients (mean age, 63 years) with wide-necked with or without a branch-incorporated aneurysms (10 ruptured and 9 unruptured) were treated with balloon-assisted coil embolizations using a double-lumen balloon catheter (Scepter CTM or Scepter XCTM) during the 7 months. Locations of the aneurysms were Pcom (n=7), Acom or A2 (n=7), MCA bifurcation (n=3), BA tip (n=1) and AChA (n=1). The initial clinical and angiographic outcomes were retrospectively evaluated.

Results: Coil embolization was successfully complet-

ed in all 19 aneurysms, resulting in complete occlusion (n=18) or residual neck (n=1). In one procedure, a thrombus formation was detected at the neck portion of the ruptured MCA bifurcation aneurysm near the end of the procedure. It was completely resolved with an intra-arterial infusion of Glycoprotein IIb/IIIa inhibitor (Tirofiban, 1.0mg) without any clinical consequences. There were no treatment-related events in the remaining 18 aneurysms. At discharge, functional neurological state improved in 11 patients (10 patients with ruptured aneurysm and 1 with unruptured aneurysm presenting with mass symptoms) and 6 patients with unruptured aneurysms had no newly developed symptoms.

Conclusions: In this preliminary case series, the newly developed double-lumen Scepter balloon appears to be a safe and convenient device for coil embolization of wide-necked aneurysms.

0129

Stent-Assisted Coil Embolisation of Wide-Necked Intracranial Aneurysms with the Lvis Jr. Stent

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Introduction: The purpose of the study is to describe our experience in 13 cases of stent-assisted coiling with the new low-profile visualized intraluminal stent LVIS Jr. in patients with intracranial aneurysms.

Methods: 13 patients were treated with stent placement and aneurysm coiling. All aneurysms had highly unfavourable dome to neck ratio. All patients were followed up with DSA and/or MRI at 6 months following treatment.

Results: The LVIS Jr. stent was successfully deployed (single stenting n=5; Y-stenting n=5; horizontal stenting n=2; X-stenting n=1) in vessels of less than 1.5 mm with no stent occlusion. Neurological complications occurred in one patient. Immediate and follow-up **Results:** were encouraging with 11 stable occlusions at 6 months. There was one stent migration, one partial stent opening and one partial stent thrombosis.

Conclusions: Deployment of the LVIS Jr. stent to assist coil embolisation of wide-necked aneurysms is feasible. This device can be deployed in relatively small arteries. Early angiographic **Results:** were favourable; however, longer-term follow-up will be required.

0134

Endovascular Coil Embolization of Anterior Choroidal Artery AneurysmsM Hirohata¹, N Fujimura², Y Takeuchi¹, K Orito¹, S Yamashita³, F Nakamura¹, H Morioka¹

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Purpose: Surgical treatment of anterior choroidal artery (AChA) aneurysms (As) continues to be challenging and technically demanding for vascular neurosurgeons. Ischemic stroke is the most common

complication after surgical clipping. The purpose of this study was to document the outcome and follow-up results of endovascular coil embolization (CE) in patients with AChAAs.

Materials and Methods: Between 1998 and 2012, 32 patients with AChAAs were treated with CE (F:M, 21:11; mean age, 63.3 years). Of these, 20 were ruptured and 12 were unruptured. AChA were originated from proximal neck in 29 and dome in 3 cases.

Results: Although 20 patients were treated with an adjunctive technique (balloon remodeling in 12 and double catheter in 8), all aneurysms could be treated with CE. Angiographic results were complete occlusion in 12, small neck remnant in 14 and dome filling in 5 patients. AChAs were preserved on final DSA in all cases. We experienced 2 peri-surgical complications (intra-operative rupture and embolic infarction in a AChA territory 6 hours after CE). 30 patients were followed up in an outpatient clinic (mean follow-up period 76.3 month). Although aneurysmal recanalization around the origin of AChA occurred in 5 patients but none of them required reoperation, neither aneurysmal rupture nor re-rupture of the treated aneurysms occurred.

Conclusion: In order to preserve AChA, percentage of neck remnant on DSA was higher than those of other location's aneurysms but none of them necessary re-embolization and no patients showed rebleeding, so CE is safe and effective therapeutic surgical alternative in AChAAs.

0137

International Subarachnoid Aneurysm Trial - ISAT Part II: a Randomized Controlled Trial

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Background: ISAT demonstrated improved one-year clinical outcomes for patients with ruptured intracranial aneurysms treated with endovascular coiling compared to surgery. Patients in ISAT were mostly good grade SAH patients with small anterior circulation aneurysms. The purported superiority of coiling is commonly extrapolated to patients not studied in the original trial or to those treated using new devices such as stents. Conversely, many patients are still clipped despite ISAT, either because they are thought either to be better surgical candidates, or to offer more durable protection from recurrences. These practices have never been formally validated. Thus, for many ruptured aneurysm patients the question of which treatment modality leads to a superior clinical outcome remains unclear.

Methods/Trial Design: ISAT II is a pragmatic, multicenter RCT comparing clinical outcomes for non-ISAT, SAH patients allocated to coiling or clipping. Inclusion criteria are broad. The primary end-point is the incidence of poor clinical outcome (defined as mRS >2) at one year, just as in ISAT. Secondary end-points include measures of treatment safety for several pre-specified

subgroups, with efficacy end-points including the presence of a major recurrence at one year; 1896 patients (862 per arm plus 10% losses) are required to demonstrate a significant difference between coiling and clipping, hypothesizing 23% and 30% poor clinical outcomes, for coiling and clipping, respectively. The trial should involve at least 50 international centres, and will take approximately 12 years to complete. ISATII is registered at clinicaltrials.gov: NCT01668563.

0139

2013 Update on the Collaborative Unruptured Endovascular vs Surgery (CURES) Trial

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Background: The best treatment for patients with unruptured intracranial aneurysms (UIA) remains uncertain. Surgical clipping is widely considered to provide more consistent and permanent aneurysm exclusion and better long-term protection from hemorrhage but may result in greater morbidity than endovascular treatment. A randomized comparison of the two treatments has not been done.

Purpose: To compare anatomical results, treatment morbidity & mortality, and long-term clinical outcome of surgical clipping versus endovascular coiling of intracranial aneurysms in a randomized controlled trial.

Methods: CURES is a two-phase RCT comparing angiographic and clinical outcomes. The lead-in phase aims to verify superior anatomical results of clipping and determine its risks. Phase II will compare clinical outcomes including overall re-treatment rates and bleeding at 5 years. CURES is now CIHR-funded. So far, in Canada, 60 patients with UIAs have been randomized from active 2 centers. The available pooled data will be presented at the conference.

Conclusion: A randomized trial comparing clipping and coiling of UIAs is feasible. Study registration: ClinicalTrials.gov Identifier: NCT 01139892 Protocol available at: www.clinical-care-trials.org

0146

Endovascular Coil Embolization of Unruptured Intracranial Aneurysms: a Korean Multicenter Study

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Background: Endovascular coil embolization has been a major treatment modality for unruptured intracranial aneurysms (UIAs) in South Korea. However,

there are still few reports on the outcomes of this procedure.

Objective: We performed a retrospective multicenter study to determine how safe and effective coiling for UIA was over the most recent 3 years in South Korea.

Materials and Methods: A total of 2180 UIAs in 2035 patients treated by coiling from Jan. 2007 to Dec. 2009 at 22 centers in South Korea were analyzed with respect to patient characteristics, the location and size of the aneurysms, procedural complications, and angiographic and clinical outcomes.

Results: Coiling was successful in 98.0% of the cases (2137/2180 aneurysms). Immediate post-procedural angiography demonstrated complete occlusion in 62.6% (1337/2137 aneurysms), residual neck in 32.4% (692/2137), and residual sac in 5.0% (108/2137) of the cases. The rate of any procedure-related adverse event was 6.9% (148/2137 aneurysms). The permanent morbidity and mortality were 1.8% (39/2137 aneurysms) and 0.1% (2/2137 aneurysms), respectively. Follow-up conventional angiography or MRA at ≥ 6 months was performed in 85.7% (1832/2137 aneurysms). Major recanalization was noted in 3.9% (72/1832 aneurysms, mean follow-up interval, 12 months). Among these, 68 aneurysms (3.7%) were re-treated. Aneurysm of the middle cerebral artery (MCA) was a risk factor for incomplete occlusion ($P=0.049$) and major recanalization ($P=0.046$). During follow-up, no aneurysmal rupture occurred.

Conclusions: Endovascular coil embolization of the UIAs has been an effective preventive modality with low procedure-related morbidity in South Korea.

0161

Hyperperfusion Syndrome after Coil Embolization of Cerebral Aneurysm

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Objective: Cerebral hyperperfusion syndrome is regarded as a serious complication of carotidocerebral revascularization procedures. Meanwhile, similar phenomenon had been observed in cerebral aneurysm clipping or coiling. Here we are reporting a case of probable hyperperfusion syndrome with a large aneurysm embolization.

Case: 46 y female with a large un-ruptured right internal carotid aneurysm. The patient was successfully treated by coil embolization with dual anti-platelet therapy. 18 hours later, she developed hemorrhage unrelated to the aneurysm.

Discussion: The exact mechanism of hyperperfusion syndrome is not well understood. In carotid stenosed patients rapidly increased flow goes into hypoperfused area inducing various clinical symptoms. In the case of aneurysm embolization autoregulatory failure may exist at distal branch and it increases the vascular permeability and edema. Dual anti-platelet medication may increase the severity of the symptom. The details will be discussed comparing the cases of hyperperfusion after carotid stenting and flowdiversion therapy.

0162

Intra-Aneurysmal Flow Disruption with the Web Device: Midterm Anatomical Follow-up in a Series Of 51 Patients

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Purpose: The **Objective:** of intra-saccular flow disruption is the modification of aneurysmal flow by placing a device in the aneurysm sac. Preliminary reports have shown the efficacy of this technique, but its mid-term efficacy has not yet been evaluated.

Materials and Methods: Clinical, procedural, and anatomical data were collected in 9 European centers treating intracranial aneurysms with WEB for more than one year. Clinical and procedural data included age, gender, modalities of treatment, treatment complications, and clinical outcome at hospital discharge and 1 year were collected with a follow-up of at least 1 year. Preoperative, postoperative, intermediate (3-6 months), and mid-term (12-18 months) follow-up DSA or MRA were collected and independently and anonymously evaluated by an experienced interventional neuroradiologist. Occlusion at intermediate and midterm follow-up was separately evaluated using a 4-grades scale (A: total occlusion, AB: opacification of the proximal recess; B: neck remnant, C: aneurysm remnant). Occlusion at midterm was also visually compared to intermediate follow-up and classified as improved, stable, or worsened.

Results: 49 patients (34F, 15M, aged 35-74 years, mean: 57.2) harboring 51 aneurysms were included. Aneurysm location was middle cerebral artery in 23 cases, basilar tip in 10 cases, anterior communicating artery in 9 cases, internal carotid artery in 7 cases, and other in 2 cases. Anatomical results are presented and analyzed according to clinical, procedural, and anatomical characteristics.

Conclusion: This series is presenting the first analysis of mid-term anatomical **Results:** after aneurysm treatment with WEB.

0178

Evaluation of Flow Dynamic Change of Treatment of Giant Intracranial Aneurysms with Flow Diverter

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Object: To evaluate the application of quantitative DSA (Q-DSA) in monitoring the dynamic changes of parent arteries and intra-aneurysmal flow in treating giant intracranial aneurysms with blood flow diverter, and to verify the efficacy of blood flow diverter in treating giant intracranial aneurysms.

Methods: 15 cases treated by blood flow diverters

(Tubridge, Microport) were recruited with the same inclusion and exclusion criteria. For each patient, DSA were performed with the same protocol before and after implantation. The DSA data were post-processed by a prototype software (DSA-Analysis, Siemens Healthcare). Based on the contrast density curve generated by the software, four parameters were evaluated: distal time delay (DTD) of parent arteries, absolute time to peak (TTP), area under curve (AUC) and maximal slope (MS) of aneurysms sac.

Results: DTD reduced -1.03 ± 0.53 s. It indicated that implantation of flow diverter sped up the flow within parent arteries. AUC and MS of aneurysms sac decreased to $57\% \pm 15\%$ and $49\% \pm 25\%$, respectively. The data confirmed that the volume of blood and flow rate entering the aneurysms sac were effectively confined by flow diverters. While the change of TTP within aneurysms sac was minimal: 0.32 ± 1.01 s. Therefore, TTP within aneurysms was not a sensitive parameter for the evaluation.

Conclusion: The efficacy of blood flow diverter in treating giant intracranial aneurysms was confirmed by DTD, AUC and MS parameters of Q-DSA, which could quantitatively evaluate the dynamic improvement right after implantation.

0184

Safety and Efficacy of a New Device for the Treatment of Wide Neck Bifurcation Aneurysms (pCONus) – Preliminary Experience

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Purpose: Wide neck bifurcation aneurysms (WNBA) are considered to belong to the subgroup of aneurysms with increased difficulty and risks. Balloon- and stent-remodeling are known techniques for the treatment of these aneurysms. pCONus is a self-expanding, completely retrievable, electrolytically detachable device with a proximal shaft, 4 distal petals and a nylon cross in the distal end of the shaft. The device is made to bridge the orifice of WNBA in order to allow better control of the coil occlusion. It combines elements of “waffle cone” stent deployment and the no longer available TriSpan Device. Our purpose was to evaluate the safety and efficacy of pCONus for the treatment of WNBA.

Methods: 21 consecutive patients underwent endovascular treatment of WNBA using pCONus device between February, 2012 and May, 2013. Target vessels included anterior circulation in 17 (81%) and posterior in 4 (19%). 7 patients were treated in the setting of acute subarachnoid hemorrhage (33.3%)

Results: Neither technical failure nor rupture was encountered. No premedication was used in patients with subarachnoid hemorrhage. Acute thrombi formation was observed in one patient, which resolved after administra-

tion of eptifibatide (Integrilin). After the initial procedure, total occlusion was achieved in 6 (28.6%) patients and a neck remnant was evident in 7 (33.3%). Follow-up angiography after 3 months was available in 13 patients and demonstrated complete occlusion in 6 (46.2%). Coil compaction requiring second treatment was observed in two patients. pCONus also assisted re-coiling.

Conclusion: pCONus allows controlled coil occlusion of WNBA, both ruptured and unruptured. Major complications are rare

0211

Enhancing Brain Lesions after Endovascular Treatment of Aneurysms – A Case Series

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Purpose: Complications of endovascular treatment (EVT) for aneurysms mainly include intraprocedural aneurysm rupture and thromboembolic events. The widespread use of MRI for follow-up of these patients revealed various non-vascular complications such as aseptic meningitis, hydrocephalus and brain edema. We describe another unusual complication of brain enhancing lesions after aneurysm EVT.

Material and Methods: Cases of enhancing lesions after aneurysm EVT from 4 different centers were collected. Data analysis included basic demographics, aneurysm location, devices used during procedure, imaging and clinical characteristics of the brain lesions, treatment if performed, and follow-up.

Results: We present 7 cases that developed enhancing lesions after coiling (n=3), balloon remodeling (n=1), stent remodeling (n=1) and flow diversion (n=2). Median time to lesion detection was 62.5 days. Lesions were mostly in the same vascular territory used for access. Median number of enhancing lesions was 8 (4-46) sized 2-20 mm. Two patients were symptomatic, one with paresthesias treated with levetiracetam for 6 months. Median follow-up was 22.5 months (5-63 months). On MR follow-up the number of enhancing lesions increased in 2, were stable in 1, partially improved in 3 and disappeared in 1. We could find no correlation to a specific device. Hydrophilic coated devices were used in all cases.

Conclusion: Enhancing brain lesions are a rare complication after aneurysm EVT. This complication is not exclusive to the use of any particular device. Imaging and clinical characteristics suggest a foreign body reaction. A possible source may be hydrophilic coating of the various devices.

0215

Cerebral Arterial Fenestrations and Their Significance

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Background: Arterial fenestrations are an anatomic variant with indeterminate significance. Given the controversy surrounding fenestrations we sought to define their prevalence within our practice along with their association with other cerebrovascular anomalies.

Methods: We retrospectively reviewed a cohort of 10,927 patients undergoing digital subtraction angiography (DSA) from 1995 - 2011. Dictated reports were searched for the term "fenestration" with case images reviewed for relevance. Reports from an additional 1000 DSA cases were reviewed to serve as controls.

Results: Fenestrations were identified in 228 patients (2.1%) with 59.2% female and a mean age of 52.5 years (SD = 17.0). The prevalence of an aneurysm was 60.5% and 47.2% in the fenestrated vs. the control cohorts ($p < 0.001$) and the mean aneurysm size was 6.7 mm (SD = 4.2) vs. 7.7 mm (SD = 5.0) ($p = 0.04$). The presence of aneurysmal subarachnoid hemorrhage (SAH) and non-aneurysmal SAH between the fenestrated and control populations were 60.1% and 50.1% ($p = 0.05$) and 15.8% and 13.0% ($p = 0.32$), respectively. For the subset of patients with an aneurysm arising directly from a fenestration relative to those patients with an aneurysm not immediately associated, the prevalence of aneurysmal SAH was 66.7% vs. 58.6% ($p = 0.58$). Fenestrations were more often within the posterior circulation (73.2%) than the anterior circulation (24.6%), though there was no difference in the prevalence of aneurysms within these groups (61.1% vs. 60.7%, $p = 1.0$).

Conclusions: Cerebral arterial fenestrations are a rare anatomic variant that may represent a risk factor for aneurysm formation and intracerebral hemorrhage.

0219 Stent/balloon Combination Assist Technique for Wide-Necked Basilar Terminal Aneurysms - Technical Note

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The authors present an enhanced endovascular procedure for the coiling of broad-necked basilar terminal aneurysms with a combined balloon/stent assist technique. A balloon-assisted catheter is inserted in the origin of one posterior cerebral artery (PCA) and an assisted stent is deployed from the opposite PCA to the basilar artery. A microcatheter for coiling is inserted through the stent strut (trans-cell approach), and the aneurysm is coiled under the stent support and assisted balloon inflation to keep the patency of both PCAs. This technique is more beneficial for reducing the risk of stent deformity than Y-stenting, and stent deformity might induce a higher risk of thromboembolic complication. Additionally, it provides a simpler procedure than other advanced stent techniques, and enables an easy approach when retreatment is necessary for aneurysm recurrence. This technique may be one of the useful procedures for embolizing broad-necked basilar terminal aneurysms safely and effectively.

0230 Middle Cerebral Artery(MCA) Trunk Aneurysms and Their Relationship with Perforators: 3D Angiographic Evaluation

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Purpose: MCA trunk aneurysms are usually located at origins of early cortical branches. Their relationship with lenticulostriate arteries (LSA) is important when considering any treatment. Owing to 3D capability of digital subtraction angiography, it becomes easier to define the branching vessels and their relationship with LSA. This study analyzed the 3D angiographic anatomy of the MCA trunk aneurysms focusing on the branching vessels and their relationship with LSA.

Materials and Method: Between November 2011 and May 2013, there were 18 consecutive MCA trunk aneurysm cases. We excluded aneurysms at bifurcation. Any cortical artery larger than 1mm in diameter was considered as bifurcation one. We reviewed angiographic data on 3D workstation again with various post-processing conditions focusing on the identification of the branching vessels where the aneurysm was located and the analysis of its relationship with LSA.

Results: Of 18 patients, 10 aneurysms (56%) were located at the origin of the early frontal cortical branches (EFCB) with superior direction, 4 (22%) at the origin of the early temporal branches (ETCB) with inferior direction, 3 (17%) at the origin of the LSA, and 1 (6%) had no branching vessel. Perforators were involved with the aneurysms or their branching vessels in 12/18 (67%). None of the aneurysm with ETCB showed any close relationship with LSA while 9 (90%) of the aneurysms with EFCB did.

Conclusion: MCA trunk aneurysms are located at the origins of early cortical branches or LSA. They have close relationship with LSA except for the lesions located at the origin of ETCB. Additional attention should be paid to avoid perforator injury during the treatment.

0253 Blood Blister Aneurysms - Should We Leave Them Alone???

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Background: Blood blister aneurysms (BBAs) are a rare type of small wide-neck shallow aneurysms, most commonly arising from the non-branching sites of the supraclinoid ICA. Due to very unfavorable morphology and fragile walls, they are prone to intra-procedural rupture and are difficult to treat surgically and endovascularly. Endovascular techniques including early stent and coiling, double stenting, parent artery occlusion and flow diverter stents have all been tried by different groups recently with varying claims of success.

Purpose: The goal of this retrospective study is to analyse our experience of management strategies in a

small number of BBAs and to see if any one strategy could be recommended over the others.

Materials and Methods: 6 patients (males: females = 2:4 ; mean age,) with ruptured BBAs over 5 years in a large Neurovascular centre were reviewed. The clinical presentations, angiographic findings, treatment strategies, clinical and angiographic outcomes were analyzed.

Results: Experience from our small group of patients questions the role of aggressive endovascular techniques in the acute phase of BBAs. These aneurysms behave very different to the usual intracranial aneurysms and our experience clearly points to the need for improving knowledge of these aneurysms.

Conclusion: Experience from our small series suggests that initial conservative management coupled with close angiographic observation followed by delayed endovascular/surgical treatment is a reasonable strategy in this group of aneurysms. Further multicentre studies on the management of these rare aneurysms are indicated before accepting aggressive and often expensive treatment strategies.

0258

Can We Justify the Embolization of Unruptured Aneurysms? - Analysis of Our Clinical Survey of 1,026 Patients for 18 Years

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Purpose: We inspect its efficacy and problems of embolization for unruptured aneurysms with reviewing our cases.

Material and Methods: The clinical objects are 1,226 unruptured aneurysms treated with endovascular embolization in 1,026 patients over 18 years in our institute and affiliated hospitals. Cases were stratified into three separate periods based on the development of devices, techniques, equipment and management: the first period (1995-2000), the second period (2001-2005) and the third period (2006-2012). Clinical **Results:** were retrospectively evaluated.

Results: Major procedure-related complications occurred in 56 operations including 9 perforation, 27 ischemic complications, in which 11 patients were in unfavorable outcome. The rate of complications are periodically decreasing, 12 % (23/188) in the 1st period, 5.9% (23/386) in the 2nd and 2.0 % (13/647) in the 3rd. The rate of complete occlusion of the aneurysm of each period was achieved in 39 %, 55%, and 58%, respectively. 22 aneurysms required reembolization due to the marked recanalization. The rate of re-treatment is significantly higher in the 1st period than in the 3rd one. 17 cases (77%) of re-re-treatment cases have been stable without major recanalization.

Conclusion: Aneurysmal embolization has been rapidly developed due to fine and various shaped coils imaging technology and advanced assisted technique. Periprocedural anti-platelet management in the 3rd period yielded the revolutionary improvement of clinical

results due to safe and certain embolization. According to our results, the recent embolization under the proper indication may be acceptable for the treatment for unruptured aneurysms.

0262

Endovascular Treatment of Ruptured Intracranial Aneurysms in Octogenarian

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Purpose: The Japanese population is aging faster than any other in the world. The number of elderly patients with ruptured intracranial aneurysms has increased in the last decade. The aim of this study was to analyze technical **Results:** and clinical outcomes in octogenarian patients with ruptured intracranial aneurysms treated with coil embolization.

Methods: We reviewed the clinical records of 639 patients who underwent endovascular treatment for ruptured intracranial aneurysms between January 2005 and March 2013. Among them, 78 patients were 80 years or older. WFNS grading at initial presentation were as follows: grade 1, 10; grade 2, 25; grade 3, 7; grade 4, 18; grade 5, 18. Clinical outcomes were assessed at 3 months with the Glasgow Outcome Scale (GOS). The favorable outcome was defined as good recovery or moderately disabled.

Results: Endovascular treatment resulted in 20 complete occlusion (25%), 37 residual neck (47%), 16 residual aneurysm (20%), and 6 technical failure (8%). Procedure-related complications occurred in 16 patients (20%), 5 of which resulted in clinical deterioration. GOS at 3 months were as follows: good recovery, 17; moderately disabled, 18; severely disabled, 25; vegetative survival, 3. Fifteen deaths occurred, 3 were procedure-related and 5 were due to medical complications. Twenty-five percent of patients were independent and discharged home at 3 months. The favorable outcome was significantly associated with lower WFNS grading at initial presentation (p=0.001).

Conclusion: Endovascular treatment of ruptured intracranial aneurysms in octogenarian patients appears to be feasible in patients with mild subarachnoid hemorrhage.

0275

Parent Artery Coil Occlusion to Treat Fusiform Serpiginous Aneurysms: a Good Technique?

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Introduction: Origin straight vessels, not bifurcations. Dissection of the internal elastic lamina. Acute: Small, no

thrombus and SAH. Chronic: Bigger and thrombosed. Acute dissecting: SHA, treatment with STENT. Fusiform without thrombus in ICA, vertebrobasilar and P1 (good PX). Chronic dissecting: Serpentine with thrombus (TEST). Blister-like (saccular in straight vessels): SAH, treatment STENT

Material and Method: 10 Patients with lateral aneurisms, not proper for balloon test occlusion, remodelling technique or STENT (4 anterior circulation and 6 posterior circulation). Under sedation, 5000 U. heparin, The coil is positioned in the entry of the aneurism (30 min).

Discussion: Previous studies about sacrifice with coils: Chaloupka AJNR (96) 2 aneurisms of the superior cerebellary artery (SCA). J. Dion AJNR (99) Aneurism of P4 and distal AICA. Eckard AJNR (2000) 9 peripheral aneurisms, coil occlusion of the main artery after injection of 30 mg. amital. Mawad AJNR (2001) 7 aneurisms of the PCA. Moret AJNR (2002) 3 aneurisms of P2. Cekirge Neuroradiology (2002) 8 aneurisms of PCA. Lubicz AJNR (2003) 3 SCA. Biondi A. AJNR (2006) 8 peripheral aneurisms. Andreou A. AJNR (2007) 15 peripheral aneurisms.

Conclusion: In patients with fusiform, dissecting or serpentine aneurisms which can not be treated with balloon, remodeling, stent and coils, the occlusion of the aneurism and the main artery, after realizing a coil occlusion while visualizing collaterals and clinical respond, is effective and safe with low morbidity and mortality.

0277

Inflow and Outflow Blood Velocities at the Aneurysm Ostium correlate with the Pressure Loss Coefficient: Towards a better Understanding of the Importance of Ostium Hemodynamics for Aneurysm Rupture

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Purpose: To quantify the relationship between the pressure loss coefficient (PLC), a potential surrogate marker for aneurysm rupture¹, with the inflow and outflow characteristics at the aneurysm ostium. Ostium hemodynamics are of interest as they are altered by flow diverter (FD) treatment

Materials and Methods: From Computational Fluid Dynamics simulations (Star-CCM+, cd-adapco) of eight cerebral aneurysms, inflow and outflow mean velocities were determined at the aneurysm ostium. Statistical significance of correlations with blood velocities and pressures in the parent artery, in the aneurysm dome and with the PLC were investigated.

Results: Statistically significant correlations ($p < 0.05$) between PLC and mean inflow (correlation coefficient $CC = 0.96$) and outflow ($CC = -0.88$) at the ostium were found. In addition, statistically significant correlation of the PLC with the mean blood velocity inside the aneurysm was established ($CC = 0.89$). None of the hemodynamic parameters correlated with the area of the inflow or outflow region at the ostium.

Conclusion: Inflow and outflow velocities into cere-

bral aneurysms at the ostium were found to strongly correlate with the pressure loss coefficient, a potential surrogate marker for aneurysm rupture. This finding is of interest towards a better understanding of hemodynamic alterations at the ostium caused by FD treatment which aims at reducing aneurysm rupture risk.

References:

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0280

Outcome of Coil Protrusion from Intracranial Aneurysms into the Parent Vessel

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Purpose: To study the outcome of intracranial aneurysm coil protrusion into the parent vessel.

Materials and Methods: Between January 2010 to May 2012, consecutive patients of endovascular aneurysm coiling for both ruptured and unruptured intracranial aneurysms were studied for presence of coil protrusion outside the aneurysm. This was divided into: mass, loop, tail or no protrusion. Both clinical and imaging follow up were done. Any thromboembolic events during the procedure or in follow up and use of anti-platelet agents were documented. Paired *t* test was performed with p value < 0.05 considered significant.

Results: We had 90 patients and 93 aneurysms (Ruptured-53 (57%); Unruptured-40 (43%); Anterior circulation-62.4%; Posterior circulation- 37.6%). Thirteen patients (14%) were treated with SILK flow diverter, so excluded. Balloon remodeling was used in 9 patients; stent was used in 4 patients and double microcatheter technique in 1 patient. There was no coil protrusion in 54.2%, loop protrusion in 25%, mass protrusion in 18% and tail protrusion in 2.8%. Antiplatelet medication was used in 36.4 % of patients with coil protrusion. Thromboembolic events noted in 1 patient with no protrusion, 2 patients with loop protrusion ($p = 0.26$). Seven patients died within 30 days of coiling, all of them presented with SAH.

Conclusion: There was no significant increase in the thromboembolic events in the event of coil protrusion into the parent vessel at the end of endovascular coiling of intracranial aneurysm.

0282

Initial Multicenter Clinical Experience with Novel Penumbra PC 400 Coils

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Purpose: Since the introduction of the GDC coil, aneurysm coil technology has seen substantial progress. We reviewed our initial clinical experience with the novel 0.020 Penumbra PC 400 coil to assess device safety and effectiveness.

Materials and Methods: At 4 high volume centers, 133 aneurysms were coiled with PC 400 coils, 84 elective and 49 ruptured, from 2/2011 to 9/2012.

Results: Average aneurysm size was 8 mm with 28% PCOM, 43% other ICA locations, 21% ACOM and the remaining Basilar, MCA and Vertebral. Balloon assisted coiling was utilized in 15% of the cases, stent assisted coiling in 18%, and both balloons and stents in 4%. Average packing density was 38.7% (N=97). An initial Raymond Scale of 1 was achieved in 32% of cases, Raymond scale of 2 in 24%, and Raymond Scale of 3 in 43%. To date, almost half (66) of the patients have angiographic follow up. Based on the same/better/worse scale, the vast majority of aneurysms showed stable or improved angiographic outcome at 6 months and one year. Thirty-six had improved, 24 remained unchanged and 6 worsened, 0 patients required re-treatment. A 5% peri-procedural adverse event rate was found. Three patients (2%) were thromboembolic; all 3 were SAH cases, of which 2 had no clinical sequelae. Four (3%) had aneurysm perforations, 3 with no clinical sequelae, and one SAH H/H grade 4 patient died, resulting in an overall morbidity and mortality of 2 (1.5%). As we continue to use the coils and accrue follow up, we will update data at the time of the meeting.

Conclusion: The new Penumbra PC 400 coils demonstrated very high average packing density and long term occlusion rates with a safe profile.

0290

Clinical and Radiographic Results for Acutely Ruptured Anterior Communicating Artery Aneurysm Treated with Endovascular Aneurysm Embolization

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Background: The anterior communicating artery (ACoA) is the common location for cerebral aneurysm (AN). Surgical clipping may be difficult due to both the complex arterial relationships and the potential coexistence of ACoA anomaly. Endovascular coil embolization (CE) for ruptured ACoA AN has the advantage of being minimally invasive. The aim of this study was to evaluate long-term clinical and radiographic **Results:** of ruptured ACoA AN treated using CE.

Material: From 1998 to 2012, 148 patients (F:M=80:68, mean age, 68.9 years) with ruptured ACoA AN were treated with CE. Preoperative clinical grade (Hunt and Hess) was II in 70 patients, III in 29, IV in 29, and V in 20. Maximum diameter of AN on digital subtraction angiography was 1.8-24(mean, 4.2) mm.

Results: Angiographic results just after CE were as follows: complete obliteration of AN in 73 patients;

small neck remnant in 57; and dome filling in 18. We encountered 3 thromboembolic occlusion of the anterior cerebral artery and one intraoperative rupture. Twelve patients suffered from symptomatic vasospasm. Clinical outcome at discharge (GOS) was as follows: GR in 87 patients; MD in 24; SD in 10; and dead in 19. Of the 127 patients followed in the outpatient clinic, 106 underwent annual magnetic resonance imaging (MRI). Within the follow-up period (mean, 7.5 years), 28 patients died due to other disease, 1 showed rebleeding from the treated aneurysm, 10 showed recanalization of the AN on MRI, 5 were treated with further CE and 3 were treated using neck clipping.

Conclusion: Long-term follow-up **Results:** of CE for ruptured ACoA AN represent a satisfactory and useful therapeutic alternative for ruptured ACoA AN.

0293

Long-Term Follow-Up of Unruptured Cerebral Aneurysms without Treatment in single physician's experience over 12 years; Compared with Those Treated by Endovascular Surgery

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Purpose: Annual bleeding rate of unruptured cerebral aneurysms have been reported relatively low. Indication of treatment for these patients is controversial. Results of long-term follow-up of unruptured aneurysms without treatment are analyzed.

Material and Method: 917 patients with unruptured cerebral aneurysm were included in this study. All the patients were referred to single physician over the past 12 years. According to aneurysm size, shape, location, and family history of SAH, endovascular treatment was recommended. 661 patients selected observation and 256 patients endovascular treatment. In observation group, MRA was repeated every 6-12 months in follow-up. When aneurysm growth is detected, treatment is considered. In treated group MRA was repeated every year afterwards.

Results: Follow-up was performed from 6-144 months, with average follow-up period 39.7 months (6-144) in observation group and 76.5 months in treated group respectively.

Aneurysm rupture occurred in 15 patients in observation group (2.1%). Final outcome of ruptured patients is GR 3 cases (20.0%), MD 2 (13.3%), SD 4 (26.7%), Dead 6 (40.0%). Annual bleeding rate is 0.7%. Rupture rate is higher (1.0%) in aneurysms over 10mm in diameter. In 7 patients aneurysm growth is observed in follow-up and aneurysms were treated with good results. In treated group results are GR 249 cases (97.3%), MD 3 (1.2%), SD 2 (0.8%), Dead 2 (0.8%) respectively. Kaplan-Meier survival rate of both groups are similar without significant difference.

Conclusion: 1. Observation has better outcome in unruptured small cerebral aneurysms. 2. Treatment is indicated when aneurysm growth is detected in follow-up.

0320

The Use of Invasive Intracranial Arterial Pressure Monitoring During the Endovascular Cerebral Aneurysms' Surgery.AM Netlyukh¹, VM Shevaga¹, MR Kostyuk², VM Salo¹, OJA Kobyletskiy¹¹ Lviv National Medical University named after Danylo Halitsky, Ukraine. ² Institute of Neurosurgery named after acad. A.P. Romodanov, Kyiv, Ukraine.

Purpose: To define the method of estimation of blood-flow on the brain arteries by determination of parameters of cerebral hemodynamics during the neuroendovascular operations.

Materials and Methods: The intracranial arterial blood pressure was invasively monitored with the transducing system during endovascular coiling procedure at 19 patients. The measurements were performed from tips of guider catheter, placed into internal carotid artery (ICA) and of microcatheter, placed inside aneurysm, on different stages of aneurysm repair.

Results: Absolute blood pressure inside ICA was fluctuated between 106/39 and 161/47 mm of Me and correlated with non-invasively measured systemic arterial pressure. The calculation of mean arterial pressure (MAP) in lumen of aneurysm was done to access the risk of intraoperative aneurysm rupture and the effectiveness of aneurysm occlusion. The initial intraaneurysmal MAP was measured on the level 115,6±16,7 mm of Me and it showed insignificant decrease down to 105,5±12,0 mm of Me after end of occlusion. The intraaneurysmal MAP during aneurysm filling was lower than initial on 42,1% of cases, but in course of 57,9% of procedures it was noted the elevation of intraaneurysmal MAP 35,6±9,4 mm of Me higher than initial.

Conclusion: Further measurements and angiographic follow-up of aneurysm recanalization are both needed to estimate accuracy of proposed invasive intracranial arterial and intraaneurysmal pressure monitoring for prognosis of remote **Results:** of aneurysm occlusion. The rise of intraaneurysmal pressure noted during aneurysm filling with coils can serve as additional risk factor of intraoperative aneurysm rupture.

0330

Continuous Intra-Arterial Dilatation with Combination of Nimodipine and Milrinone in Severe and Refractory Vasospasm

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Purpose: Cerebral Vasospasm (CVS) is a potentially devastating complication after aneurysmal subarachnoid hemorrhage. Chemical angioplasty is effective but the effects are short lasting and sometimes require multiple sessions of intra-arterial dilatations. Both intra-arterial nimodipine and intra-arterial milrinone have been used in isolation in various nonrandomized studies to treat CVS. Here we present our series of cases with refractory vasospasm which were treated by con-

tinuous intra-arterial infusion (CII) of both nimodipine and milrinone.

Material & Methods: Six consecutive subarachnoid hemorrhage patients (4 women; 2 men mean age, 46.3 years) with severe CVS despite maximum medical therapy underwent CII within 2 hours after the onset of clinical symptoms. After anticoagulation, microcatheters were inserted distally in the concerning supra-aortic vessels. Nimodipine 3mg followed by 8 mg of Milrinone was given over 90 min. Following which continuous nimodipine and milrinone infusion was administered at the rate of 2mg/hr and 1mg/hr respectively for 72-168 hours. Duration of CII was determined by neurological status and transcranial Doppler.

Results: In all patients, neurological deficits improved and transcranial Doppler confirmed a reduced blood flow velocity. Neurological outcome was good (mRS score, 0-2) in 4 patients, whereas 1 patient had a moderate clinical outcome (mRS score, 3-4) and 1 patients had a poor outcome (mRS, 5) because of the SAH.

Conclusion: The effect of milrinone and nimodipine are synergistic due to their action on different receptors. CII with both nimodipine and milrinone is an effective and safe option in severe and refractory CVS.

0347

Endovascular Treatment of Intracranial Vertebral Dissection with Subarachnoid Hemorrhage

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Purpose: To study the efficacy of endovascular treatment on intracranial vertebral dissections with subarachnoid hemorrhage.

Material and Methods: Between September 2007 and December 2012, 17 patients with acute subarachnoid hemorrhage due to vertebral dissection were treated by endovascular method. There were 14 male and 3 female patients with a mean age of 49 years (age range, 36-79 years). All patients presented with acute subarachnoid hemorrhage. Mean Hunt and Hess grade was 3.9 (range, 2-5).

Results: 13 of 17 patients were treated by coil embolization of the dissected segment including the aneurysm (internal coil trapping) and 4 patients were treated by stent-assisted coil embolization. All patients showed complete occlusion on immediate postprocedural angiograms. 9 patients died during initial hospitalization, consisting of 5 patients treated by internal coil trapping and all 4 patients treated by stent assisted coil embolization. Follow-up imaging was available in 8 surviving patients treated by internal coil trapping. All aneurysms and occluded arterial segments remained occluded on follow-up imaging at 4 to 26 months (mean, 14.9 months). 4 patients had infarctions in the medullary or territory of posterior inferior cerebellar artery. There were no recurrent hemorrhages.

Conclusion: Intracranial vertebral dissections presenting with acute subarachnoid hemorrhage are known with high risk of recurrent hemorrhage. Internal coil trapping of the dissected segment was effective in preventing recurrent hemorrhage.

0368

Coiling and Clipping of Middle Cerebral Aneurysms: a Systematic Review on Clinical and Imaging Outcome

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Background and Purpose: Papers on outcome after endovascular or surgical treatment of middle cerebral artery (MCA) aneurysms are sparse. To assess the overall outcome of coiling versus clipping of both unruptured and ruptured MCA aneurysms we systematically reviewed the literature to determine clinical and imaging outcome.

Methods: We searched the electronic databases from January 1990 up to May 2013 for studies of > 10 MCA aneurysms treated with coiling or clipping to assess clinical and angiographic outcome, including mortality, intraprocedural and posttreatment complications. Risk of bias was assessed with the newcastle ottawa scale for cohort studies.

Results: Fourty eight studies totalling 1955 patients with 2172 unruptured and 1208 patients with 1208 ruptured aneurysms were included. Mortality rates and favourable outcome rates for coiled aneurysms were 1.2% and 97% for unruptured and 6.4% and 80% for ruptured aneurysms. for clipped aneurysms the rates were 0.3% and 97% for unruptured and 11% and 73% for ruptured aneurysms. Overall rebleed / posttreatment bleeding rates were 1.4% in coiled aneurysms and 2.2% in clipped aneurysms. Complete or near complete occlusion was seen in 88% of endovascular treated aneurysms, no rates were calculable for clipped aneurysms.

Conclusion: Based on local expertise both a "clip first" or a "coil first" policy can be advocated in non complex unruptured MCA aneurysms. Due to the low level of evidence and a high risk of bias no firm conclusions can be drawn on what is the best treatment for MCA aneurysms. To improve future studies data for both surgical and endovascular treatment should be published according to reporting standards.

0403

The Value of Delayed MRI in Angiogram Negative Subarachnoid Haemorrhage

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This study was performed to assess the efficacy of delayed magnetic resonance imaging (MRI) to identify a structural cause for spontaneous subarachnoid haemorrhage after angiogram negative subarachnoid haemorrhage (AN-SAH). All patients with AN-SAH presenting to a single centre over a six year period were reviewed.

During the study period, 1023 angiograms were performed of which 242 (23.7%) were negative. A second DSA was performed in 48 patients, of which two were positive for aneurysms. Of the remaining 240 patients, 131 underwent a subsequent MRI Brain. One hundred and five (80.2%) of MRI were performed four or more

weeks after DSA. Of the patients who underwent MRI, two patients with cavernomas were identified. In both patients intra-parenchymal haemorrhage on the acute CT suggested the diagnosis.

Thirty nine patients underwent MRI of the cervical spine, none of which showed a cause for SAH.

MRI was negative in 57 patients with peri-mesencephalic SAH. None of the 240 patients with AN-SAH re-presented to our centre with haemorrhage during the study period. This data suggests delayed MRI following AN-SAH has a low yield and is not routinely necessary. MRI may still be useful where there is atypical distribution of haemorrhage or parenchymal component on the initial imaging.

0407

Recanalisation of Giant Aneurysm Following Treatment with Flow Divertor

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Purpose: Reporting unusual finding in treatment of giant aneurysm using flow diverter.

Material and Methods: 50 year old female presents proptosis and ophthalmoplegia. The diagnostic cerebral angiogram showed giant aneurysm in the cavernous segment of the internal carotid artery. The aneurysm was treated as with SILK flow diverter in the first two months of follow up; the angiogram showed deterioration of the aneurysm, however the second follow-up angiogram in 6 months showed the recanalization of the aneurysm. The aneurysm was retreated with coiling. Patient was on dual antiplatelet for two years after the insertion of the SILK flow diverter was stopped for the cardiac pace maker placement; the patient had a stroke on the ipsilateral side. To the best of our knowledge, recanalization of the aneurysm after flow diverter Occlusion is not the reported case – imaging, including MRI and angiogram finding will be discussed .

Conclusion: Recanalization of giant aneurysm post treatment with flow divertorisis may. Consider as possible complication .

0411

Six Year Angiographic Follow Up of Aneurysms Coiled in BRAT

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Introduction: The Barrow Ruptured Aneurysm Trial demonstrated that among patients presenting with acutely ruptured aneurysms there was 10.5% absolute reduction in death and disability when evaluated one year after treatment if endovascular coiling was selected over clipping. Follow up at three years has shown that there remains a trend favoring coiling over clipping but the size of the benefit has dropped below statistical significance (absolute difference 5.8%, p =

0.25). This study was conducted to better understand the long-term impact of incomplete aneurysm occlusion upon patients treated by coiling in BRAT.

Methods: Imaging follow up in BRAT was mandated at 3 and 6 years after treatment. All patients available for the six year imaging were included. All coiled aneurysms were independently assessed as to Raymond scale, stability and size of aneurysm remnant. Retreated patients were reviewed to evaluate the impact of retreatment on the independently adjudicated mRS outcomes.

Results: 128 patients were treated by coiling. 55 of the coil treated patients were available for imaging follow up at the 6 year end point of the trial, and an additional 24 patients had follow up imaging at 3 years but not at 6 years. 20 patients underwent retreatment, of which 2 were retreated after the proscribed three year imaging follow up. No patient experienced a decline in mRS as a result of retreatment and no coiled aneurysm rebled.

Conclusions: The erosion over time of the statistical benefit attributable to coiling at one year is not secondary to aneurysm recurrence, retreatment, or rehemorrhage and more likely represents a decrease in statistical power with a dwindling sample size.

0419

Posterior Fossa Dissecting Aneurysm Treatment Strategy. Our Experience

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Introduction and Objectives: The posterior fossa dissecting aneurysm treatment is a challenge of endovascular surgery. Nowadays the treatment techniques are considered as a matter of debate. We want to do a retrospective evaluation of our experience in the posterior fossa dissecting aneurysm endovascular treatment.

Material and Methods: From March of 2009 to April of 2013 we tried in our endovascular service, 10 patients with posterior fossa dissecting aneurysms. We do a retrospective evaluation of the endovascular treatment, clinical follow-up and image.

Results: 9 patients had rupture aneurysms and 1 patient had an unruptured aneurysm. The endovascular treatment was performed with success in all patients. 2 patients were treated using Onyx, 1 was treated with Onyx and coils, 1 was treated with stent, 4 were treated only with coils and 2 were treated with stent and coils. The artery occlusion was performed in 4 cases. Angiographic study was performed in 4 cases noticing 1 aneurysm recanalization, patient who required a treatment with stent and coils. There were no complications during the treatment. The clinical follow-up was favorable in 9 patients (90%).

Conclusions: In our experience, the posterior fossa dissecting aneurysm can be treated in a secure way getting good **Results:** by endovascular treatment. Different kinds of embolization materials are available, which can be chosen depending on each aneurysm characteristics, the localization, configuration and artery diameter.

0433

Endovascular Treatment of Tiny Anterior Choroidal Artery Aneurysms

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Objective: Nowadays, little is known about the efficacy and feasibility of the procedure for the treatment of tiny anterior choroidal artery aneurysms (AChANs) with the maximum diameter not more than 3 mm.

Method: 21 cases with 21 tiny AChANs treated with endovascular methods from 1999.07 to 2012.07. 19 patients presented with spontaneous subarachnoid hemorrhage. Among the 21 aneurysms, 16 were ruptured, 18 wide-necked and 18 with ipsilateral AChAs involved in the necks.

Results: 10 aneurysms were managed with simple coil embolization, and balloon remodeling technique was used in 2 case. 9 cases underwent intravascular stent implantation. Coil packing was done in 8/9 aneurysms, and stent implantation alone was used in the remaining aneurysm. Immediate angiography showed complete occlusion in 5, neck remnant in 7 and incomplete occlusion in 8 aneurysms among the coil packed ones. The AChAS happened in one of the 3 cases were showed occluded by the immediate angiography. Another patient also encountered transient AChAS despite the patent AChA. Intraoperative hemorrhage happened in 1 case. With the exception of 1 patient (HH grade 4) was loss to follow up, no hemorrhagic complication was seen during the remaining 20 patients. Follow-up angiography was available in 18 /20 patients, which showed 6 aneurysms remained stable, 5 were getting better and 6 aneurysms treated with stent totally healed, and only one aneurysm recanalization was found.

Conclusion: Endovascular treatment is a feasible and effective therapeutic alternative for tiny AChANs. The AChA should be keep patent during the procedure to avoid AChAS. Stent is helpful for the patency of AChAs and the healing of TACHANs.

0435

Metal Artifact Correction for Flat-Detector CT Imaging of Coiled Intracranial Aneurysms

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Background: Metallic coil induces severe streaking artifact in Flat-detector CT (FDCT). We report a dedicated Metal Artifact Correction (MAC) prototype software (Siemens Healthcare) reduced this artifact for FDCT of coiled intracranial aneurysms.

Methods: 11 patients who received stent-assisted coiling for their intracranial aneurysms were included into this study. For each pre-coiling and post-coiling FDCT scans were performed. 3 image volumes were generated: one pre-coiling, one post-coiling uncorrected and one post coiling corrected volume. The last one

was post-processed by MAC software. The image slice impaired worst by artifact was selected as target for comparison. A 24 cm² ROI was placed on soft tissue around the coils for quantitative analysis. Two parameters were evaluated: the range of image intensity, indicating the inhomogeneity, and standard deviation of image intensity, indicating the image noise. Two experienced neuroradiologists evaluated the images qualitatively.

Results: The mean processing time of the MAC software was 20 minutes. Both observers agreed that the metal artifacts were reduced for all cases. MAC software reduced inhomogeneity from 716 ± 293 to 352 ± 60 , and image noise was reduced by 41% on average. We also found that corrected volume have comparable inhomogeneity and image noise with the difference of intensity range and standard deviation were only 70 ± 51 and 17%.

Conclusion: The MAC software largely reduced metal artifacts caused by coiling and the image intensity of soft tissue were restored to comparable levels of image before coiling.

Metal-artifact-free FDCT images could be more helpful for detecting the bleeding around coiled aneurysms.

0437

A Novel Endovascular Patch Embolization Method to Treat Paraclinoid Carotid Ruptured Blood Blister-Like Aneurysms: Preliminary Results

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Objective: The paraclinoid carotid blood blister-like aneurysms (BBAs) aneurysm is one of the most devastating cerebrovascular lesions. These aneurysms are quite dangerous due to their fragile neck and high re-bleeding rate after embolization can reach 50% according to literature data. We reports our preliminary experience with the endovascular treatment of BBA using a novel endovascular patch method.

Methods: A consecutive 5 cases carrying BBAs was enrolled. The technical key points includes introduction of ultrasoft coils and intentionally leave parts of coil mass outside of the aneurysm neck, which is restricted by stents. All the cases underwent 3 weeks, 3 and 6 months DSA follow-up. Clinical and angiographic data was collected.

Results: Immediate technical success was 100%, with one case of post procedural death of VP shunt infection. One case was found aneurysm remnant with 3 weeks' DSA follow-up and a stent was employed. No aneurysm remnant was found with all cases during 3 and 6 months' follow-up. There was no rebleeding event occurred perioperatively and post-operatively within the 6 months period. All parent artery and covered side branches were patent.

Conclusions: Our preliminary **Results:** demonstrate the effectiveness and safety of the endovascular patch

embolization **Method:** in selected cases of blood blister-like aneurysms.

0446

Endovascular Management for Direct Carotid Cavernous Fistulas with Onyx or in Combination of Coils Under Intra-Arterial Balloon Protection

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Purpose: Endovascular management with the good preservation of ICA has become the first-line choice for direct CCFs. This paper aims at elucidating the effectiveness and safety of embolization with Onyx or in combination of coils under balloon protection.

Methods: We reviewed 41 cases with direct CCFs in our case library from 2005 to 2012. 23 cases were treated with sole Onyx embolization via transarterial approach, and the other 18 cases with higher flow rate or larger fistulous ostium were treated with transarterial or transvenous embolization with both Onyx and coils. All the procedures were under intra-arterial balloon protection.

Results: Immediate post-procedure angiograms demonstrated complete occlusion in 39 cases and 2 cases with small residual fistulas using both Onyx and coils embolization. Average volume of Onyx was 3.9 ml in Onyx group and 2.6 ml in Onyx and coils group. The average length of bare coils used for cases was 102.0cm. Hydrogel-coated coils were used in 5 cases with 75.2 cm on average length each. Angiographic follow-up within 8 months (4.1 months on average) after procedure and up to 24-months clinical follow-up revealed complete occlusions without any complication related to the procedure in all cases.

Conclusion: The technique of embolization using Onyx or in combination of coils under intra-arterial balloon protection is feasible for direct CCFs. It is an effective and safe options of treatment with rare complications.

0449

Predictors for Symptomatic Intracranial Spontaneous Vertebral Artery Dissection Aneurysm (sis-VADA) Recurrence after Reconstructive Treatment with Stent(S)-Assisted Coiling

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Purpose: We aimed to evaluated predictors of symptomatic intracranial spontaneous vertebral artery dissection aneurysm (sis-VADA) recurrence after reconstructive treatment.

Methods: 111 patients with 113 sis-VADAs underwent reconstruction using stent(s) and coils. The treatments and predictors of recurrence were retrospectively analyzed.

Results: 58 sis-VADAs underwent single-stent treat-

ment, and the remaining 55 sis-VADAs underwent treatment with 2-4 overlapping stents. Follow-up angiography was available for 94 sis-VADAs 12 -78 months after treatment, and 10 patients occurred recurrence, including 7 angiographic recurrences and 3 post-treatment hemorrhagic recurrences. One and 2 of hemorrhagic recurrences initially presented with ruptured and un-ruptured forms, respectively. None of 3 hemorrhagic recurrences underwent follow-up angiography, and they all subsequently died. A higher rate of post-treatment recurrence was observed in single stent group than in multiple stents group ($p<0.05$). Partial obliteration after single stent treatment (odds ratio [OR] =3.152; 95% confidence interval [CI], 1.293-7.686; $p=0.012$), PICA-involving lesions reconstructed with single stent (OR=4.607; 95% CI, 1.172-18.113; $p=0.029$), and PICA-involving lesions with immediate partial obliteration were independent predictors for recurrence in the reconstructed sis-VADAs.

Conclusions: Multiple stents had the clear preponderance in preventing recurrence. Partial obliteration after single stent, PICA-involving lesions reconstructed with single stent, and PICA-involving lesions with immediate partial obliteration were independent predictors for recurrence after reconstructive treatment of sis-VADAs.

0450

Treatment of Dissecting Aneurysms of the Posterior Inferior Cerebellar Artery: Anatomical Considerations and Clinical Consequences

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Background and Purpose: Posterior inferior cerebellar artery (PICA) dissecting aneurysms require rapid and aggressive treatment mostly by sacrificing the parent vessel. In this report we assess the clinical consequences of PICA vessel occlusion in view of the local vascular anatomy.

Materials and Methods: We performed a retrospective search of our neurovascular database in the period 2007-2012. Patient characteristics, clinical presentation and outcome, and the detailed vascular anatomy including collateral circulation were recorded.

Results: We identified 12 patients (6 male; mean age 51 years; range 21-63). Ten patients presented with WFNS grade I and II, the other patients with grade III and V. Outcome was favorable in 11 patients; one patient died due to the mass effect of the cerebellar hematoma. In ten patients, treatment consisted of parent vessel occlusion, the other two with selective aneurysm coiling. An extradural PICA origin and downstream dissecting aneurysms were present in five patients. Collateral circulation was visible prior to occlusion in three patients, after occlusion in another five patients. Only one of these eight patients showed clinical and radiological signs of cerebellar ischemia. The two patients without collaterals both developed ischemia. No patient developed a Wallenberg syndrome.

Conclusion: Parent vessel occlusion for treatment of PICA dissecting aneurysms was well tolerated with a

favorable outcome in 11 out of 12 patients. Regional collateral circulation from the ipsilateral anterior inferior cerebellar artery (AICA) and superior cerebellar artery and contralateral PICA was sufficient to prevent severe cerebellar ischemia.

0453

Endovascular Treatment of Tandem Wide-Necked Intracranial Aneurysms Using Semi-Jailing Technique

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Background: Tandem wide-necked intracranial aneurysms which means multiple aneurysms located close to each other. These particular lesions often requires complex endovascular procedures. However, the use of semi-jailing technique has made it easier. We have performed this study to evaluate the efficacy and safety of semi-jailing technique for the treatment of tandem wide-necked aneurysms.

Methods: A retrospective review was performed for the patients with tandem wide-necked intracranial aneurysms treated by semi-jailing technique between May 2009 and June 2013. We collected and analyzed the data for these patients, including demographics, morphology of the aneurysms, treatment results and follow-up.

Results: Twenty-one patients were identified with a mean age of 57.2 years. 42 aneurysms were treated by using the semi-jailing technique. As for the 42 aneurysms treated with stent-assisted coil embolization, 20 were completely occluded immediately after the procedure, 8 had residual neck remained, and 14 were partially occluded. Thromboembolic event occurred in 3 cases without permanent effect. The mRS score at discharge was 0-2 in 20 patients. The follow-up angiography of 17 patients showed 12 aneurysms were completely occluded, 3 were stable and 2 were improved compared with immediate result. There was no in-stent stenosis, recurrence, or retreatment. All patients had an mRS score of 0-1 during clinical follow-up.

Conclusions: In selected patients, semi-jailing technique is feasible and helpful in the treatment of tandem wide-necked intracranial aneurysms. However, its safety and efficacy need further evaluation with larger number of cases and longer follow-up.

0456

Stent Assisted Coiling for the Treatment of 211 Acutely Ruptured Wide-Necked Intracranial Aneurysms: A Single Center 11-Year Experience

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Objective: Stent assisted coiling (SAC) for the treatment of unruptured intracranial aneurysm has been

confirmed to be safe and effective. However, it is still uncertain for acutely ruptured aneurysms (≤ 28 days). we performed this study in order to further evaluate the safety and efficacy of SAC for the treatment acutely ruptured wide-necked cerebral aneurysms (rWNCA).

Methods: The patients with acutely rWNCA treated by SAC from September 2000 to December 2011 were retrospectively reviewed. Patient demographics, morphologic features of the aneurysms, treatment **Results:** and follow-up data were collected and analyzed.

Results: A total of 230 stents were used to treat 211 acutely rWNCA. Immediate embolization **Results:** were complete occlusion in 94 cases, residual neck in 36 cases, and residual sac in 80 cases. Procedure-related complications occurred in 30 patients, leading to 20 permanent complications. 190 patients survived from the initial SAH, 152 of which have been angiographically followed-up (3 m-77 m, mean 12.5) resulting in 115 occluded, 13 improved, 16 stable and 8 recurrent. The procedure-related ischemic events were correlated with the location of the aneurysms; Early rebleeding were correlated with the immediate embolization degree and post-operative use of heparin; The total procedure-related complications were statistically correlated with the location of the aneurysms. Elder age and higher Hunt-Hess grade are independent risk factors for poor prognosis.

Conclusion: SAC for the treatment of acutely rWNCA is relatively safe and effective, which can improve the long-term efficacy and reduce the recurrence rate.

0468

Middle Cerebral Artery Aneurysms: Endovascular Treatment Outcome in Ruptured and Un-Ruptured Aneurysms

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We present the outcome, morbidity and mortalities in our acute and elective middle cerebral artery aneurysms.

0473

Defining Tissue and Function at Risk Following Vessel Occlusion for Treatment of Posterior Cerebral Artery Aneurysms

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Background: Aneurysms of the posterior cerebral artery (PCA) represent a unique subset of intracranial aneurysms. These lesions, frequently located along distal segments, are often fusiform in nature necessitating vessel occlusion for definitive treatment. The majority of patients will tolerate these interventions without deficit.

Predicting patients at risk for stroke and visual field deficit can challenge conventional test occlusion methods.

Methods: We present a relatively novel means of determining tissue and function at risk following vessel occlusion for PCA aneurysms. A 32 year old female presented with visual association cortex symptoms caused by a partially thrombosed P3 segment PCA aneurysms. The aneurysm bearing and adjacent PCA branches were infused with etomidate while the patients visual fields were assessed using a power point confrontation test. Next the aneurysm bearing branch was directly infused with 99mTc-HMPAO and the patient underwent cerebral perfusion SPECT scanning.

Results: Etomidate infusion within the non-aneurysm bearing branch elicited contralateral hemianopsia, while infusion in the aneurysm branch caused no symptoms. The images generated from the nuclear medicine scan were fused to axial MRI images, demonstrating that the at-risk tissue supplied by the aneurysm branch was separate from the calcarine cortex. The patient went on to have successful coil occlusion of the aneurysm of and parent artery, without any resulting stroke or visual symptoms.

Conclusions: Visual testing during etomidate infusion coupled with microcatheter directed SPECT scanning can define potential tissue at risk during interventional vessel occlusion.

0474

Diagnostic Utility of Delayed Angiogram for Angiography-Negative Subarachnoid Hemorrhage: Systematic Review and Meta-Analysis

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Purpose: To systematically review and meta-analyze the evidence on the yield of performing delayed DSA on initial DSA-negative adult SAH patients to: (1) determine an estimate of the overall frequency of detection of occult ruptured aneurysms, and (2) determine whether this differs between perimesencephalic (PM-SAH) and non-perimesencephalic (non-PM-SAH) subgroups.

Methods: A comprehensive search was performed to detect all relevant literature. Studies had to include adult SAH patients with initial negative DSA, who underwent follow-up DSA at any time interval. Outcomes had to be reported as proportion of patients with aneurysm identified on follow-up DSA among those initially DSA-negative. Risk of bias was assessed using a modified version of the Newcastle-Ottawa scale. The results of the included studies were combined using a random effects model; heterogeneity was assessed using the I² index. Analyses were performed for both patients with PM-SAH and non-PM-SAH.

Results: Twenty-one studies met the inclusion criteria. Overall, the studies had a low to moderate risk of bias. The overall rate of aneurysm detection on repeat DSA was 9.26% (95% CI = 6.57% to 12.36%; I² = 70%). However, the rate in PM-SAH was 1.92% (95% CI = 0.90%

to 3.32%; $I^2 = 9.4\%$), whereas that in non-PM-SAH was 14.72% (95% CI = 9.31% to 21.13%; $I^2 = 77\%$).

Conclusion: Despite limitations regarding heterogeneity, 1 out of 7 patients with non-PM-SAH with initial negative DSA was found to have an aneurysm on repeat DSA, while the rate of detection in PM-SAH was very low. These findings have important implications for management in these patients.

0482

Effect of Patient-specific Boundary Conditions on Computational Fluid Dynamics Analysis of Wall Shear Stress and Other Focal Hemodynamic Factors In Cerebral Aneurysms

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Purpose: Some intra-aneurysmal hemodynamic factors, which can be determined using Computational Fluid Dynamics (CFD), have been linked with aneurysm growth and rupture. Normally, CFD is performed using boundary conditions based on a generalized flow profile. An alternative would be to implement patient-specific boundary conditions. We aimed to investigate the effect of patient-specific versus general boundary conditions on CFD analysis of intra-aneurysmal hemodynamics.

Methods: Image data of 36 patients were selected from a larger ongoing research. Geometric data of the aneurysms was extracted from 3D rotational angiography. PC-MRI patient-specific measurements of local flow velocities were acquired as boundary conditions for CFD. For the general boundary conditions predefined Womersley equations were used. After calculation of the intra-aneurysmal hemodynamics, wall shear stress (WSS) and flow characteristics were quantitatively and qualitatively extracted from the data. Paired sample statistics were used for comparison.

Results: Quantitative analysis showed statistically significant differences in WSS values between the two methods (mean difference 23 Pa, SD 38, $p = 0.001$). These were not seen for oscillatory shear index values. In nine cases differences in flow pattern and stability were reported. WSS differences were seen in half of the cases, with nine changes in impingement zone location, and ten in lobulation WSS.

Conclusion: Compared to generalized boundary conditions, applying patient-specific boundary conditions for CFD results in large differences between the two methods regarding WSS. Differences regarding flow patterns are also seen but far less pronounced.

0484

Hemodynamics for Rupture Risk Assessment of Intracranial Aneurysms based on Measured Patient Specific Inflow Profiles

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Purpose: The purpose of this study was to identify independent assess geometric and patient specific hemodynamic determinants for aneurysm rupture.

Methods: 101 consecutive patients (63 female; mean age 54.8 years) with in total 117 aneurysms (55 ruptured and 62 unruptured) were included. All patients underwent both high resolution 3D rotational angiography and phase contrast MRI to obtain patient-specific measurements of local blood flow velocities in the inlet vessels as boundary condition for Computational Fluid Dynamics. Geometric parameters (aneurysm size, aspect ratio, shape (spherical or nonspherical) and the presence of daughter sacs), measured inflow parameters (maximal and mean flow velocity, maximal and mean flow) and aneurysm hemodynamic parameters (mean wall shear stress (WSS), max WSS, oscillatory shear index, flow stability, flow complexity, jet stability, jet concentration, and impingement zone) were extracted from the data. Univariate and multivariate analyses were performed to identify determinants for aneurysm rupture. The determinants that had a univariate significant relation with rupture status were included in the multivariate logistic regression models.

Results: Results of final analyses will be presented.

Conclusion: We present the largest cohort of patient specific hemodynamics in intracranial aneurysms, for assessment of risk factors for aneurysm rupture. Aneurysm hemodynamics were calculated with CFD, based on inflow profiles obtained from PC-MR blood flow velocity measurements and high resolution patient specific geometry from 3D DSA.

0485

Rupture Associated Changes of Cerebral Aneurysm Morphology; High Resolution 3D Imaging before and after Rupture

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Purpose: CFD is increasingly used to determine associations of hemodynamic features with rupture status. For this purpose, CFD studies typically use geometric data of ruptured and unruptured aneurysms to generate hemodynamic models. Data on these changes are sparse, because patients with ruptured aneurysms rarely have undergone previous imaging of the intracranial vasculature. The purpose of this study was to assess 3D geometrical differences of aneurysms before and after rupture.

Methods: Nine intracranial aneurysms with high quality 3D imaging before and after rupture were evaluated. 3D geometrical models before and after rupture were generated and matched for changes in maximal diameter, height, volume and displacement of aneurysm and/or its parent artery. In addition qualitative changes in aneurysm shape were determined, including number of lobulations, and displacement of aneurysm and parent vessels due to perianeurysmal hematoma.

Results: In 7 of 9 aneurysms an increase in aneurysm

volume was observed, with an average increase in aneurysm volume on post-rupture images of 137% and a median increase of 38% (-4% - 832%). The time period in which these volume increases arose was between 14 days and 4 years. Displacement up to 5 mm due to perianeurysmal hematoma was observed in 2 aneurysms. Profound shape change, such as new lobulations, were found in 4 of the studied aneurysms.

Conclusion: Most aneurysms showed an increase in volume in the post-rupture images. Furthermore, aneurysm geometry may also change after rupture due to compression by a perianeurysmal hematoma.

0487 **Packing Volume Densities by Hydrogel Coated Coils Versus Bare Platinum Coils in Endovascular treatment of Cerebral Aneurysms**

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Purpose: to look for the role of different coil types in the resultant packing density volumes.

Patients and Methods: this is a retrospective study of 354 consecutively coiled aneurysms. We divided them into Ruptured and Unruptured aneurysms and each group has been further subdivided into those treated with either Hydrogel or bare platinum coils. We used the platinum coils in 95 ruptured and 87 unruptured aneurysms and hydrocoils in 85 ruptured and 87 unruptured aneurysms. Volume fill is based on use of the Angiocalc program.

Results: The overall average volume of aneurysms treated with platinum coils was 156.75 mm³ with an average packing volume of 49.2% while the overall average volume of the aneurysms treated with hydrocoils was 349.55 mm³ with an average packing volume of 82.2%.

The average packing volumes resulted from the platinum coils were 46.37% and 52.36% in the ruptured and unruptured aneurysms respectively while the average packing volumes with hydrocoils in the corresponding groups were 80.64% and 83.72% respectively. Total occlusion (packing volume = 100%) was achieved in 5 (5.26%) ruptured and 6 (6.9%) unruptured aneurysms treated with platinum coils while it was achieved in 26 (30.59%) ruptured and 30 (34.48%) unruptured aneurysms treated with hydrocoils.

Good packing volume (60%) was achieved in 29 (30.53%) ruptured and 31 (35.63%) unruptured aneurysms treated with platinum coils while it was achieved in 71 (83.53%) ruptured and 80 (91.95%) unruptured aneurysms treated with hydrocoils.

Conclusion: hydrogel coils are proved to be more efficient than conventional bare platinum coils in achieving higher packing densities.

0496 **Endovascular Treatment of Intracranial Aneurysms. 15 Years Experience at a Single Center**

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Purpose: To describe the experience at our institution in the endovascular treatment of cerebral aneurysms.

Methodology: Cross sectional study. We reviewed the digital database of cerebral aneurysms with endovascular treatment between 1997 and 2012. We describe the demographic and technical data, treatments **Results:** and patient follow-up of ruptured and unruptured cerebral aneurysms treated.

Results: During the study period 1120 patients were treated with 1215 aneurysms. The male to female ratio was 3.7:1. The average age was 55 years. The main locations in decreasing order were internal carotid (51.65%), anterior communicating complex (15.5%), posterior communicating artery (9.39%), middle cerebral artery (6.92%), anterior cerebral artery (5.19%), basilar tip (4.94%). 69% of treated aneurysms were ruptured. The main techniques employed were coiling (74%) and remodeling technique (16%). Total occlusion was obtained in 36%, subtotal in 33% and incomplete in 31%. We report a 5.8% complication rate. Recanalization was found in 23% and major recanalization in 5% of patients. The retreatment rate was 9.8%. In patients with ruptured aneurysms functional outcome at discharge measured on the modified Rankin scale (mRS), accounts for 77% of good results (mRS 0-2) and 9% mortality.

Conclusions: The **Results:** presented are similar to other published series, with acceptable safety and efficacy ranges, which conforms international standards.

0497 **Endovascular Treatment of Ruptured Intracranial Aneurysms in Elderly Patients**

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Purpose: To describe the epidemiology, therapeutic aspects and outcomes of patients over 65 with ruptured aneurysms treated with endovascular techniques.

Methodology: Cross sectional study. We identified patients with ruptured cerebral aneurysms treated at our institution from 1997 to 2012, older than 64 years old. We describe data and seeked association with the outcome variables.

Results: 194 patients older than 64 years were found, from a total of 1120. The average age was 72.3 years (65-86 years). 83.5% of patients were women. The most common aneurysm location was internal carotid (32.9%). 79% of patients presented with 13 to 15 points in the Glasgow Coma Scale. 47% had a modified Fisher ranking of 4 and 43% of 3. 87% of patients were treated exclusively with coils. We report 9.79% of complication rate and 2.0% of retreatment rate. Functional outcome measured by modified Rankin scale (mRS) showed a rate of poor outcomes (mRS 3-6) of 52.4% at discharge, and 47.6% of good **Results:** (mRS 0-2). Patients with worse clinical onset had worse outcomes at discharge (p = 0.001).

Conclusions: The functional results and complication rates are similar to those reported by other series. The only factor associated with worse outcomes is poor clinical

0531**Third Nerve Palsy Recovery after Posterior Communicating Artery Aneurysm Coiling: a Single Centre Experience and Systematic Review**

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Background: The modality of treatment of intracranial aneurysm associated with third nerve palsy (TNP) remains a controversial topic. While Microsurgical Clipping has been the traditional treatment of choice, endovascular coiling has become a valid alternative. We analyzed the TNP recovery rates after coiling at our centre and conduct a systematic review of the literature.

Methods: We examined patients with third nerve palsies resulting from PcomA aneurysms that underwent coiling at the Hamilton General Hospital between July 2006 and July 2010.

Results: Of a total of 10 patients only 3 patients had ruptured aneurysms. Six patients presented with a complete TNP while 4 had a partial presentation. At one year, recovery was complete in 7 patients. Three patients had partial improvement. In the systematic review of the literature, 14 studies were included resulting in a total of 133 patients with third nerve palsy from PcomA aneurysms. Of these, 53.3% had ruptured aneurysms. The recovery rates were 51.1% and 46.6% for complete and partial recoveries respectively, while only 4.5% of patients had no recovery on follow up.

Conclusion: Endovascular coiling **Results:** in high rates of third nerve palsy recovery.

0558**Wide-Neck Aneurysms Located in Parent-Vessel Bifurcations and Trifurcations: Endovascular Treatment**

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Introduction: Aneurysms arising from parent vessel bifurcations or trifurcations are difficult to treat. These aneurysms are generally formed by a wide neck that originates in conjunction with other vessels. Achieving an optimal embolization and preserving the parent vessels patent can be challenging.

Materials and Methods: The medical records of patients treated between 2010 and 2013 were reviewed. Patients with wide-neck aneurysms located at the bifurcation or trifurcation of parent arteries were included in the analysis. Demographic data, angio-architecture, clinical and angiographic outcomes were recorded.

Results: Twenty patients were identified and included in the analysis. All patients underwent stent-assisted coiling (SAC). Mean age was 42 years and 10 were females. 15 aneurysms were ruptured. 19 patients were treated with SAC requiring placement of only one stent, one patient underwent placement of a second stent to protect the parent vessel. The procedural complication rate was: XX patients had follow-up angiograms: XX with catheter digital angiography and XX with magnetic resonance. One patient required a new coil-embolization due to coil-compactation on follow-up.

Conclusion: Reconstruction of complex wide-neck aneurysms located in parent artery bifurcations or trifurcations can be achieved with SAC employing only one stent. This technique demonstrated to have a low complication rate in this small case series.